ROGERS booster

A MAGAZINE DEVOTED TO THE INTERESTS OF RADIO-TV TECHNICIANS OF CANADA

ROGERS NATIONAL NEWSPAPER ADS PROMOTE YOUR SERVICE DEPT.

HERE'S HOW YOU CAN TIE IN!

Editor: Al. Jones

- *Industry news digest*
- *Applications and care of the germanium diode*
- *Service tips for technicians*
- *Merchandising and work aids*

SEPT.-OCT., 1953

Industry News Digest

July TV and radio sales . . .

New TV stations

U.S. TV station notes — WSYR-TV Syracuse moved from channel 5 to channel 3 and raised power to 100 kw. New tower is 513 feet high and the antenna 100 feet.

WBUF-TV Buffalo, channel 17, started tests on August 17.

WBES-TV Buffalo, channel 59, starts operations about September 7th.

Another Buffalo station, WTVF-TV, will be on channel 23 but starting date has not been announced.

WHEC-TV Rochester, channel 10, starts tests November 15th and programs December 1st.

WWNY-TV Watertown, N.Y., channel 48, starts November 15th.

Radio receiver sales — Apparently July was a good month for car receivers, 11,558 being sold. Home receivers accounted for another 16,992 and portables, 3,723. Total of all receivers for the year to date was 298,417.

TV receiver sales for July — TV receiver sales for July totalled 9,332. Table models 17″ and under (3,397) and consoles 18″ to 22″ (2,570) headed the list. It is interesting to note though, that the projected production for the next three months for table models 18″ to 22″ (41,338) is greater than for the apparently popular 17″ (29,345). Total TV sales for the year to date — 134,472.

Radio's Ponce de Leon — Last week Dr. Lee de Forest, who is still active in his own laboratory, celebrated his 80th birthday. Published photographs, which show his third (and very attractive) wife presenting him with a cake and a kiss, may make many an aging old-timer wish he had thought of putting a grid in the Fleming valve.

Big boost to TV market — By the end of this year the TV receiver (and service) market will get a big boost by the possible addition of another six TV stations. Canadians will then be provided with Canadian TV in major centres from coast to coast. Stations, by then, should be in operation in Regina, London, Sudbury, Winnipeg, Quebec and Vancouver — plus the new 100% French station in Montreal. Early in the new year these will be followed by Halifax, Sydney and St. John, N.B.

CBLT popularity growing — According to a survey made in Toronto, 3600 TV owners said CBLT programs were becoming more and more entertaining and that Canadian talent was getting an increased share of family preference. Since the previous survey was made 6 months ago, the number of set owners who said they practically never watched CBLT has decreased by 60%.

Note on sanitation — Some months ago we reported the results of a TV-versus-bathtub survey in the Boston area. Now we have a report from Cincinnati where there are 420,000 TV sets. The Bell Telephone Company reports 320,000 telephones in use and the Census Bureau lists 250,000 bathtubs — presumably in use.

Progress — The annual British National Radio Show opened early in September where, it is said, larger-tube TV sets were much in evidence. Most popular size appeared to be the 14-inch rectangular. In the past, 12-inch sets were most popular.

Electron tubes are big business — Figures recently released show that the average TV home in the U.S. has 21.5 tubes in the TV set and 9.5 more in radios. This gives a total of 31 tubes as compared to 19.5 light bulbs in the average home. Even if non-TV homes are included, tubes still lead since the total for light bulbs is estimated as 905 millions and that for tubes at 964 millions.

Hallicrafters builds new plant—Hallicrafters Canada Ltd., a subsidiary of Hallicrafters Co., Chicago, has completed arrangements for the construction of a $4,000,000 factory on a six-acre site northeast of Toronto. The one-story structure will employ a maximum of 250 people.

Technical Section

While physically rugged, care is required in installation

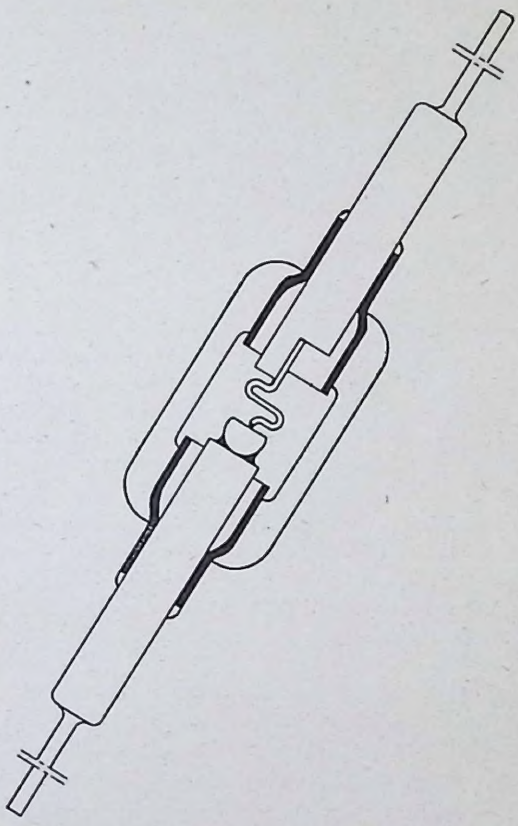
Applications and Care of the Germanium Diode

Anyone who has been following trends in television receiver design cannot help but be impressed with the increasing importance of the germanium diode. The power consumption in a television receiver is high naturally and anything that will reduce it is a Godsend to the designer. These little devices require no heater current and besides are both rugged and efficient. At extremely high frequencies the two characteristics that are largely responsible for the usefulness of the diode are its low inter-electrode capacitance and short transit time. As will be seen from the construction, which will be discussed shortly, the sharpened point of the tungsten wire makes contact with the germanium over an extremely small area so that the capacitance may be less than 1 mmfd. Transit time is extremely short because the layer through which the electrons flow may be only one-millionth of a centimetre thick.

Other advantages of the germanium diode over electron tube diodes are: (a) No contact potential to be bucked out, (b) either cathode or anode may operate at any reasonable potential above ground or both may be above ground potential and (c) the minimum life expectancy under normal conditions is at least 10,000 hours.

The nature of germanium—Germanium is a grayish-white, brittle, metallic element. Commercially it is most commonly found in the sulphide ores associated with the smelting of zinc. It is classed among the "monatomic semi-conductors" which include boron, selenium, silicon and tellurium. These elements have characteristics half-way between those of metals and insulators and electrically they do not follow Ohms Law. They have the peculiar property of permitting current to flow more readily in one direction than the other.

In this group of semi-conductors germanium is preferred because it has two advantages over the others; namely, the ability to withstand a higher inverse voltage and the ability to heal itself when broken down electrically.



Theory — It is not our intention here to go into the theory of operation of germanium as a rectifier. Actually if one takes the time to study the molecular structure of such crystals the theory is not particularly complex. Technicians have for a long time been accustomed to thinking in terms of electrons and protons and how they move in solids, liquids and vacua. However it is the idea of "holes" in semi-conductors that is a new concept to the practical technician and to which he has not perhaps adjusted himself as yet. A complete discussion of theory would involve an article in itself and so for the present we will confine ourselves to the practical aspect.

Construction — One characteristic of germanium that should be noted is its extreme sensitivity to moisture, particularly when used in diodes. As a result, the only successful diode is one that is enclosed in a container that is absolutely moisture-proof. Types of enclosures differ with different manufacturers but the one illustrated here is typical. Briefly the construction is as follows:

A small pellet of copper-plated germanium is first welded to a nickel pin and then the upper side of the pellet is processed with a fine abrasive both to expose the germanium and polish it to optical smoothness. A short whisker of tungsten wire is then welded to another pin and given a kink to provide a spring action. In early types the point of the tungsten was ground but an electrolytic process is now used to bring the end to a point and it should be noted that the angle of the two sides of the point is fairly critical.

The pin bearing the germanium is now inserted into one metal sleeve of a glass envelope and soldered securely. The pin carrying the tungsten is inserted in the other sleeve, the point centred on the germanium with the right degree of pressure and a small current is passed to weld the point to the germanium. The pin is then soldered and another small current passed to ensure the weld. Tests are then made for absolute moisture-proofing. This process is followed by a number of tests to determine the rectifying efficiency; duds are rejected and the balance is divided into groups of varying characteristics to meet certain specifications.

Applications — Naturally there are hundreds of applications for a device like this throughout the electronics field but those the service technician is likely to encounter, at the present time at least, are as follows:

Video detectors—In video detectors the rectifying element may be connected in series or shunt. The type 1N64 has been found to provide excellent efficiency in the shunt circuit and, because of its low forward resistance, it performs equally well in the series circuit. In the series circuit any variation of the forward resistance of the diode will affect the band pass and so load resistance should be kept relatively high.

D.C. restorers — In these circuits germanium diodes are now common substitutes for a vacuum tube and the type 1N65 is quite suitable because of its low forward resistance and high back resistance. Its peak voltage rating of 85 volts is sufficiently high to withstand normal signal levels.

Second detectors and AVC — The type 1N48 diode is commonly found in AM second detector circuits as well as for AVC. The circuits are conventional with a crystal substituted for the vacuum tube diode and all circuit values are pretty much the same too.

Frequency discriminators — Type 1N48 diodes may be found in some FM discriminator stages, being merely substituted for the familiar vacuum tube diodes. One difference may be noted however and that is, to avoid having to match the two crystals for equal back resistance, they are usually shunted with 220 K resistors.

To the above, of course, can be added the 1N48 in detector probes for test instruments, TV antenna orientation meters and in voltage doublers, triplers, quadruplers and even a special circuit employing 16 type 1N48 by which 115 volts a.c. can be stepped up to 1,000 volts d.c.

Germanium power rectifiers — Germanium rectifiers of the power type are just coming into use at the time of writing. These new rectifyers are of the broad area or junction type and thus somewhat similar to the selenium and copper oxide. Since they can be operated at extremely high current densities, a large d.c. output can be obtained from a very small unit. One typical model has the following ratings: RMS input voltage—130, d.c. output current—400 ma, peak inverse voltage—400, full load voltage drop—1.5 volts. These ratings apply at a temperature of 40°C.

Unfortunately, at temperatures above 40°C, the output drops off seriously. However, if the ambient temperature can be kept below 40°C, they offer the following advantages over selenium or copper oxide: (a) Lower forward voltage drop per ampere and therefore the best regulation. (b) Highest output per cell (c) Smallest size per watt output.

Installing germanium diodes — The following remarks apply to the point-contact diodes first discussed.

No abnormal tension should be applied to the connecting leads when installing a new diode. Leave some slack or put "kinks" in the leads to allow for some spring action.

Excessive heat from soldering may change a diode's characteristics permanently and so must be avoided. Leads should be

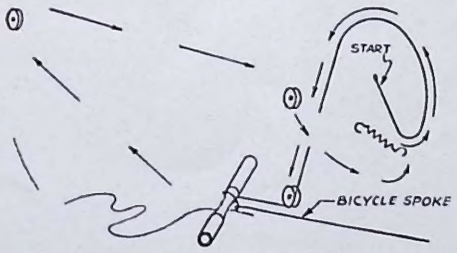
(Please turn to page 8)

Send us your latest service hint. If the editors of Rogers "Booster" find it suitable for publication you will receive Rogers new socket wrench set FREE.

Cleaning volume controls — I have found that an excellent way to clean noisy volume controls is to turn the receiver on its back, remove the knob and run some carbon-tetrachloride down the shaft with an eye dropper. Shaft should be rotated back and forth at the same time. Pure carbon-tet will not harm any insulation in the control or chassis.

Alex Urquhart, Montreal, Quebec.

Stringing dial cords — In some of the more complicated dial stringing jobs feeding the cord around the various shafts and pulleys and back behind the dial plate can become quite a chore. I find that a bicycle



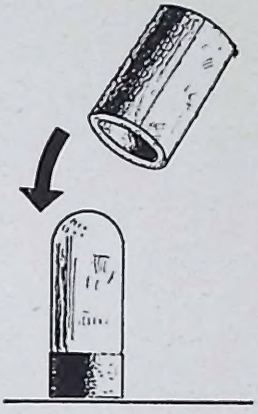
spoke makes a very good tool for feeding and pulling the cord around hard-to-get-at places. One end of the spoke has a fine thread on it and this should be bent to form a loop.

Roy Boyd, Mitchell, Ontario

Improving old models — We tear old i.f. transformers apart and remove the iron slugs and use these in the r.f. and antenna coils of older receivers. The slugs are cemented into place with small bakelite mounting strips. In the larger coils the brass screw fastened to the slug is threaded through a bakelite strip and this in turn is cemented to the top rim of the coil. After mounting the slugs it usually means re-aligning the whole set but it sure gives those old models a boost.

L. R. Payne, Nipawin, Sask.

The hot tube problem again — Pulling out hot tubes has always been quite a problem since it is usually necessary to grip them quite tightly and this is hard on the fingers. Most vibrators are encased in a sponge rubber container to muffle noise, these being



open at one end and just the right size to slip over a tube. Because they are rubber they not only insulate but give you a good grip on the tube. We keep several of these jackets around the work bench for this purpose.

E. P. Hitchon, Belleville, Ontario.

Intermittent fault location — Intermittent faults are among the greatest time consuming problems the technician has to face and we have found the following procedure very helpful in the field: (a) Tune the receiver to a quiet spot on the dial and connect a signal generator between antenna terminal and chassis. (b) Feed in a strong unmodulated r.f. signal at the same frequency. It should be strong enough to cause a pronounced avc action. Volume control is turned on full. (c) Gently tap the various suspected components and this will normally produce a noise similar to a microphonic tube. However a sharp crackling sound indicates a faulty connection or component. The r.f. and 1st i.f. stages are extremely sensitive to mechanical disturbances but this will be less pronounced as you get closer to the output stage.

William L. Traver, Port Credit, Ont.

Merchandising Section

National Newspaper Ads Promote Your Service Department!

Every month millions of set owners across Canada are exposed to newspaper advertisements similar to those illustrated on our cover.

These ads are working for YOU . . . urging set owners to take their sets to authorized dealers for repair.

Caricatures of frustrated people battling with their faulty sets are the "attention getters" in these ads. The copy reads: "There's a **better** way to **fix** it! Call the man who displays this sign". Each ad then displays the well known **Rogers service decal.**

To help dealers get the full benefit from these ads, Rogers have produced dozens of aids which **feature the service decal.** These include: 10″ three-colour decals for use on store windows, doors and trucks; seven-colour personalized 3-D display kits, postal cards, door knob hangers, job tags, "First Aid for Ailing TV and Radios" folders (see page 7); electric clocks and book matches.

Alert dealers are now using many of these aids to tie in with Rogers national advertising campaign. They promote their service department at the point of sale and through the mails with decals, display kits, postal cards, matches, etc. A listing and description of these aids appears on page 8. You too, can reap full benefit from the newspaper campaign by using Rogers specially prepared aids featuring the service decal.

3-D Display Kits Move Fast! . . . Rogers Plan New Kit For January

Last month "Booster" readers were offered a completely new type of point-of-sale unit known as Rogers personalized 3-D display kit. Response has been so overwhelming, that the orders now outnumber the quantity of kits available.

As explained in the enclosed letter, Rogers aim to do the "right thing" by their many dealer friends. A NEW KIT IS NOW BEING REPRINTED FOR RELEASE IN JANUARY! You are urged to fill out the enclosed registration form. It will assure you of a kit in January.

Rogers 3-D kit is the result of a coast-to-coast survey to discover the type of display the majority of dealers wanted. We feel, as do hundreds of dealers, that the 3-D display is one of the best window units ever developed for promoting our dealers' service departments.

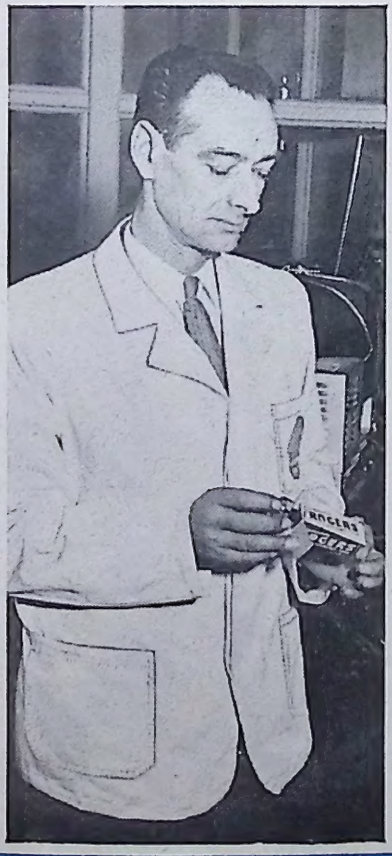
USE THESE NEW COLOURFUL FOLDERS AS MAILERS, GIVE AWAYS

These brilliantly designed, colourful folders, are imprinted with your store name, address and telephone number. One is entitled "First Aid for Ailing Radios"; the other "First Aid for Ailing TV".

Each clearly explains why the layman should leave his defective set well enough alone and call in a qualified radio technician. When opened, the radio folder shows a picture of a radio chassis and lists the many different things that can go wrong with the set. The TV folder is similar, shows a TV chassis and lists the sources of trouble.

These folders carry an illustration of the service decal and tie in with Rogers national advertising campaign (see page 6). They instruct your customers to call you immediately their set goes haywire. They sell your service by explaining to customers how they can save time and money by calling the man best qualified to diagnose the trouble.

Use these "First Aid" folders in your store, mail them to customers, have children distribute them door to door. $2.50 per 100, including imprint.



Rogers Service Jackets

- **Long wearing tuff-drill**
- **Sanforized**
- **Washable (no dry cleaning)**
- **Bar tacked pockets (no tearing)**
- **Durable double sewn seams**
- **Neat fly front (with concealed buttons)**
- **Pocket emblem (good looking and colourful)**

It's easy to make a good impression on customers with the new Rogers service jacket or shop coat. No flimsy garments are these! They are well tailored in double weight tuff-drill, a rugged fabric that will give you 3 to 4 years of hard wear. The convenient fly front with concealed buttons eliminates any chance of scratching highly polished radio and TV cabinets. Arms length pockets are roomy and reinforced and the breast pocket features a bright, colourful emblem. Very useful as protective garments when repairing sets on home calls. Worn in your shop, they give you a trim, well groomed appearance. Cost of service jacket is $3.75, full length coat is $5.00. Sizes are 36 through 46. Check your size on the enclosed order card.

Rogers Dealer Aids

Postal cards — The most inexpensive way to get YOUR message about YOUR service to set owners in your area.

100 Cards (Imprinted) $1.50
250 Cards (Imprinted) $3.00
500 Cards (Imprinted) $5.00

Rogers electric clock — Brilliantly backlighted in colours of green, gold, red and black it centers attention on you as offering expert radio-TV service.

A self-starting 60 or 25 cycle electric clock movement combines with large, easy to read numbers and a red sweep second hand. A quality clock at a very low price. $12.95 (postage included.)

Book matches — Here's a dandy give away . . . a good-will builder for use on your counter or when making home calls. There are 1,250 super salesmen in every package. Printed in vivid, eye-catching colours of red, green, yellow and black. Each book is imprinted with your store name, address and phone number.

Real advertising impact at a very little cost, $7.25 for a package of 1,250, and we pay the postage.

Display kits — (See details, page 6)

"First Aid . . ." folders — (See details, page 7).

Door knob hangers—Here's the answer to attracting new business! These colourful door knob hangers will carry your message about your service into homes in your trading area. Each card is imprinted with your store name, address and telephone number. These outstanding business-builders cost $2.00 per 100; $3.50 for 250, and $6.50 for 500.

Job record card — Here's a tag with colour and eye appeal! Your store name, address and phone number is imprinted on the receipt and warranty. This tag provides you with a record of work done, charges and date. The words "Terms Cash" are printed on the customer's receipt. It stops credit requests.

Order your imprinted job record tags now! 100—1.00; 250—$1.75; 500—$2.75; 1000—$4.50.

Eye-catching decals—Here's the perfect tie-in with Rogers national advertising campaign aimed at boosting your service sales. Customers and prospects alike will be looking for these colourful red, green and yellow decals. They identify you as a technician who offers the very best in dependable service at a fair price. They're perfect for your door, window or truck. These prestige service builders are FREE! Limit, 3 per customer.

Applications and Care of the Germanium Diode (Cont.)

left as long as possible and heat applied only long enough to make a good joint. Where short leads must be used, the lead should be gripped with pliers between the diode body and the soldering point to absorb some of the heat. This should also be done if other wires are being soldered to the same junction.

Testing — If it is suspected that the characteristics of a diode have changed, one lead may be disconnected and a test made with an ohmmeter. An open, of course, will be immediately obvious. If the diode is in good condition, a forward resistance of several hundred ohms should be indicated and, with the leads reversed, the resistance should be many thousands. Whatever the reading may be, the ratio of high to low should be in the order of 100:1.

As was pointed out before, the semiconductors do not follow Ohm's Law and the resistance of a germanium diode varies with the applied voltage. Therefore ohmmeter measurements should not be compared with the advertised rating for that type of diode.

The ohmmeter test is not a good check for efficiency of the type 1N65 used in video detector circuits except to indicate open circuit. If the video output is weak or the i.f. bandpass curve is distorted, a substitute diode should be tried.

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